LQ production at the TeVatron

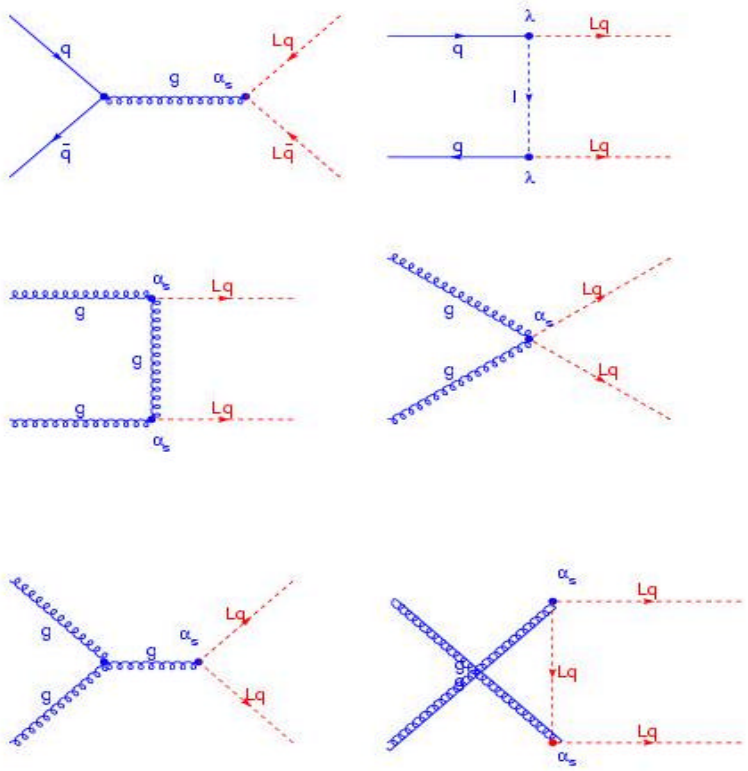


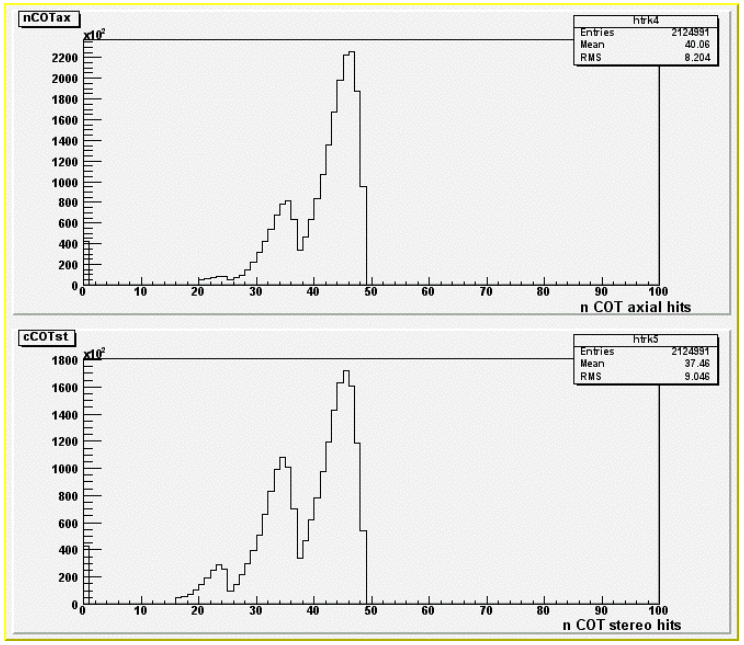
Figure 2.4: *Feynman diagrams for pair production of leptoquarks at hadron colliders.*

Tracks quality

PadTracks

- Implicit: nSiAx>=3, nSi90Z=0,2,3
- Passes OIZ
  - **nCotAx>=20, nCotSt>=16 unless >5 phi Si hits**
  - **nSi90Z>=2, nSiSAS>=1 (but accept 3 Z w/o stereo)**
  - **errZ0 < 0.05cm**

OIZ Tracks (W/ links to parents below)
OIS Tracks (W/ links to parents below)
OI Tracks (W/ links to parents below)
COT-only
Si-standalone
Junk COT (for road searches, etc.)
OI Tracks' COT Parents (W/ links to children above)



E/p cut on MC

6% drop in signal acceptance

ID efficiencies - baseline cuts

central tight eff = 0.789901 +/- 0.00706272

central loose eff = 0.79982 +/- 0.00693714

eff CC = 0.639613 +/- 0.00989979

ID efficiencies - Z' cuts

central tight eff = 0.848512 +/- 0.00621572

central loose eff = 0.854223 +/- 0.00611792

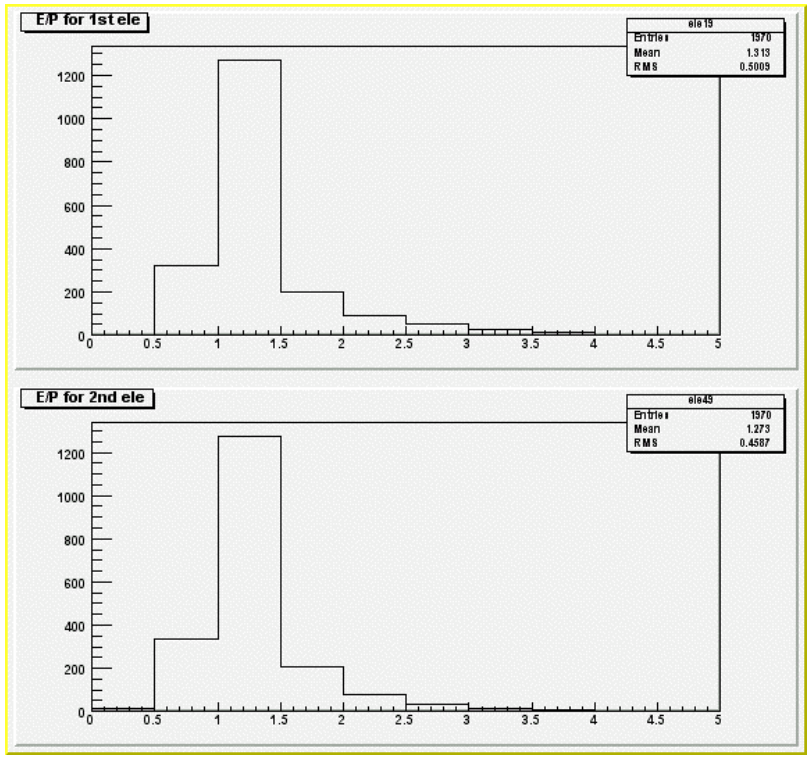
eff CC = 0.729664 +/- 0.00872147

evt passing cut 1 EtTot_array[jj] > 20 && temp_no_match[jj] == 0	3317	
evt passing cut 2 trkpt_array[jj] > 10	3305	
evt passing cut 3 hadem_array[jj] <= 0.055 + tote_array[jj]*.00045	3293	
evt passing cut 4 tote_array[jj]/pmom_array[jj]	3269	3201

E/p cut

On data there is a reduction of about 20% in the selected events.

Since this is a search I believe we can loosen up the cuts



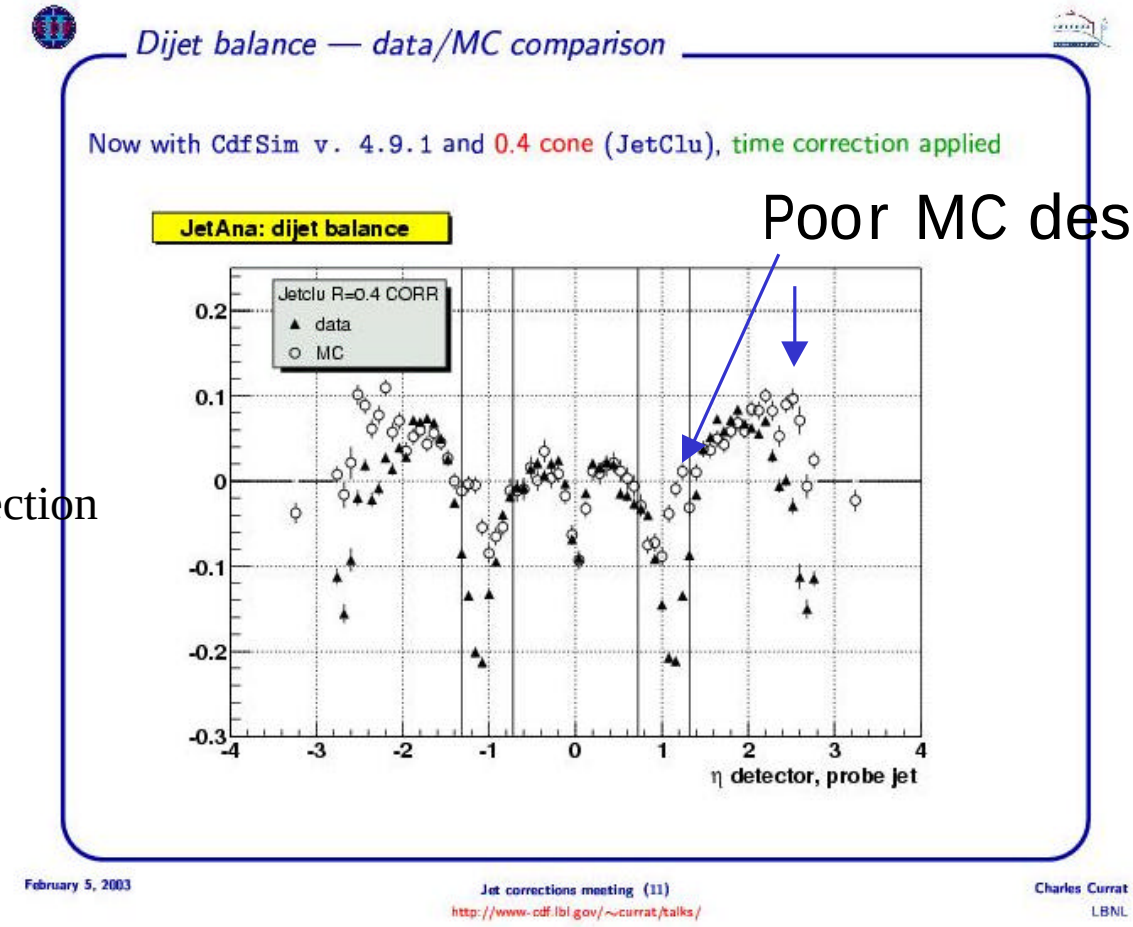
Jet energy corrections

- Plan to run the Jet Energy correction code on the data and MC before blessing
  - jets will be selected in the $|\eta| < 2$ region
    - different from run I
    - no signal efficiency loss
- Right now I ran quick and dirty way of correcting:
  - jets in $|\eta| < 2$
  - for $|\eta| < 0.7$ absolute 20% increase in E_T
  - for $0.7 < |\eta| < 1.4$ absolute + relative 40%
  - for $1.4 < |\eta| < 2.0$ absolute 20%

Number of events with 2 ele > 25	1970
2 jets with $E_T(j1) > 30$ and $E_T(j1) > 15$ GeV	21
removal of events with $76 < M_{ee} < 110$ GeV	7
$E_T(j1) + E_T(j2) > 85$ GeV && $E_T(e1) + E_T(e2) > 85$ GeV	2
Ö$((E_T(j1) + E_T(j2))^2 + (E_T(e1) + E_T(e2))^2) > 200$ GeV	0

- 10% systematics due to this corrections

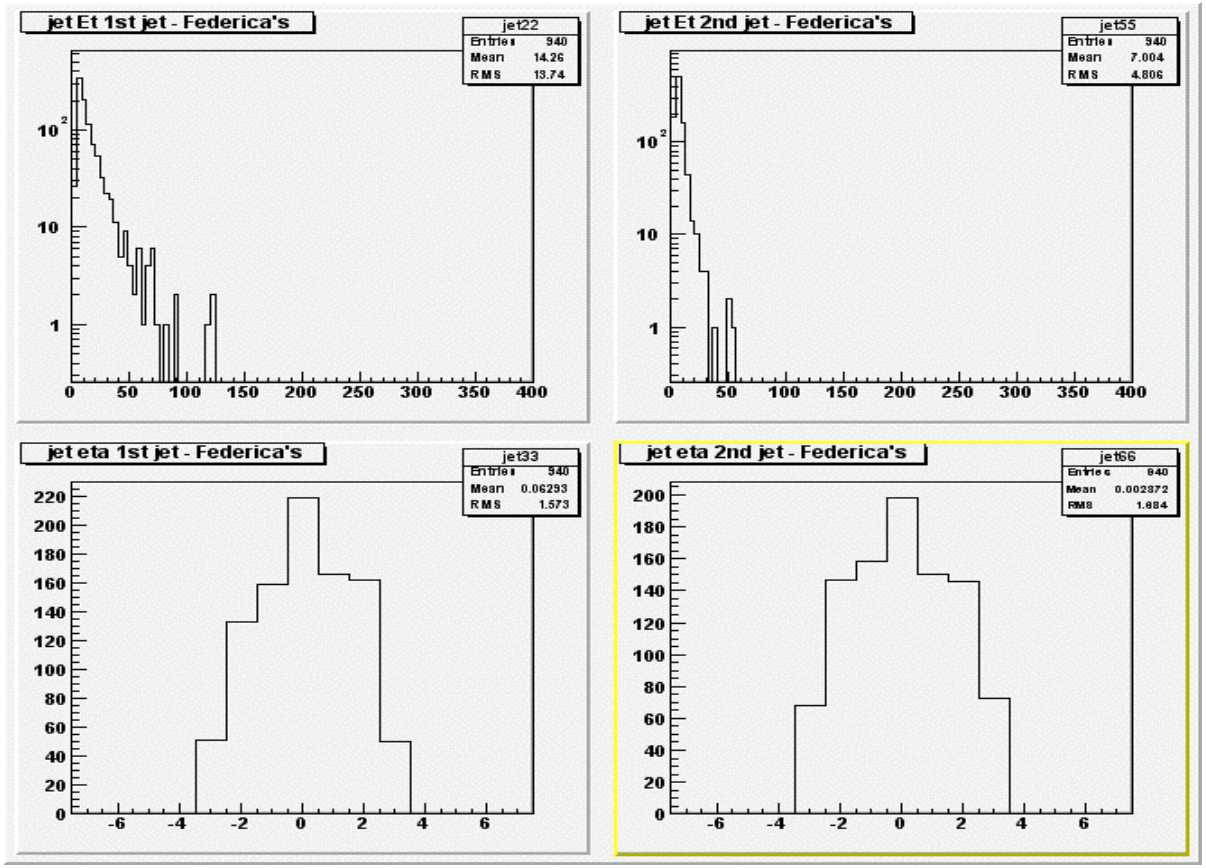
MC/Data comparison



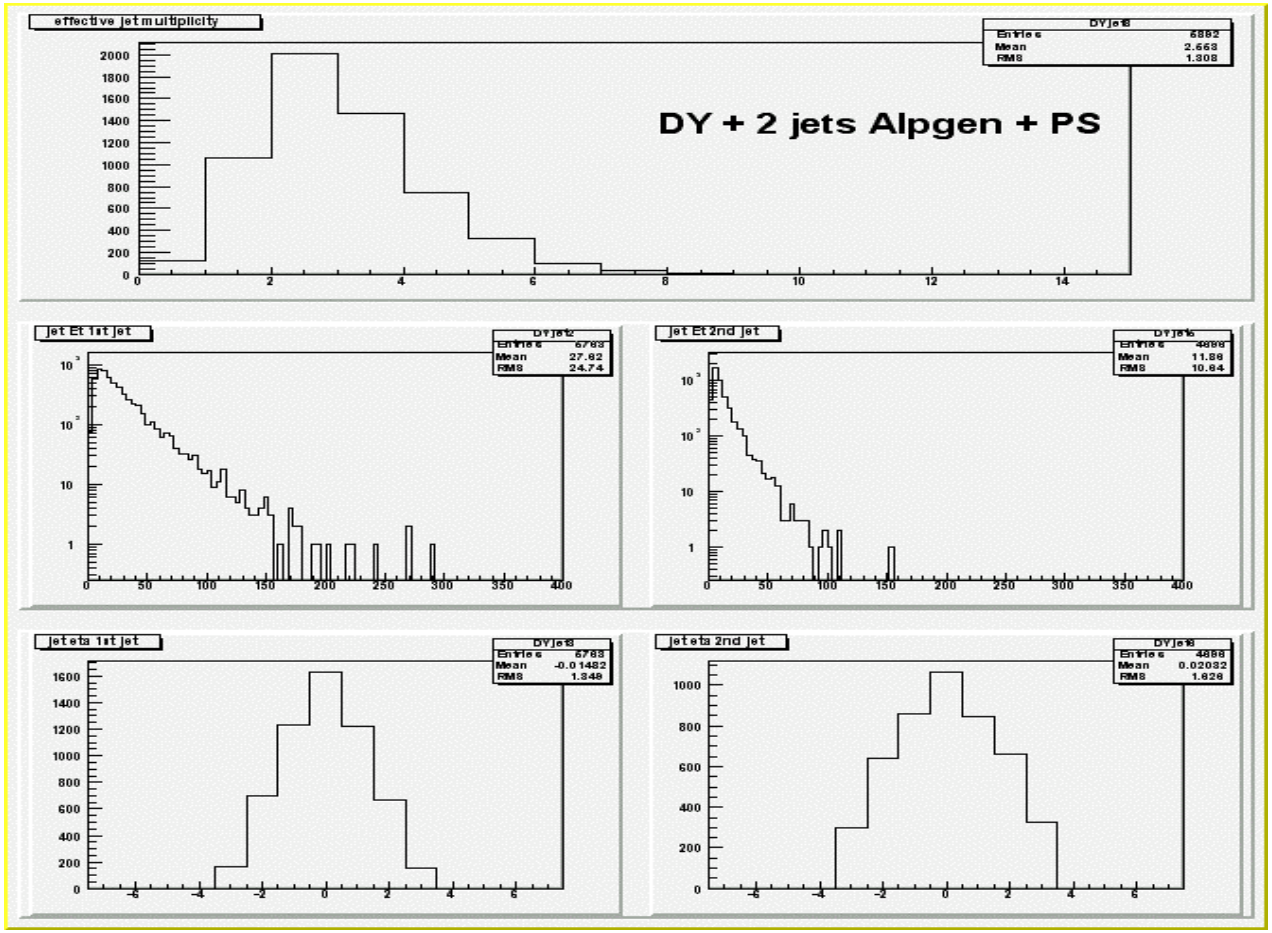
Poor MC description

Maximum correction is ~20% at $\eta=1$

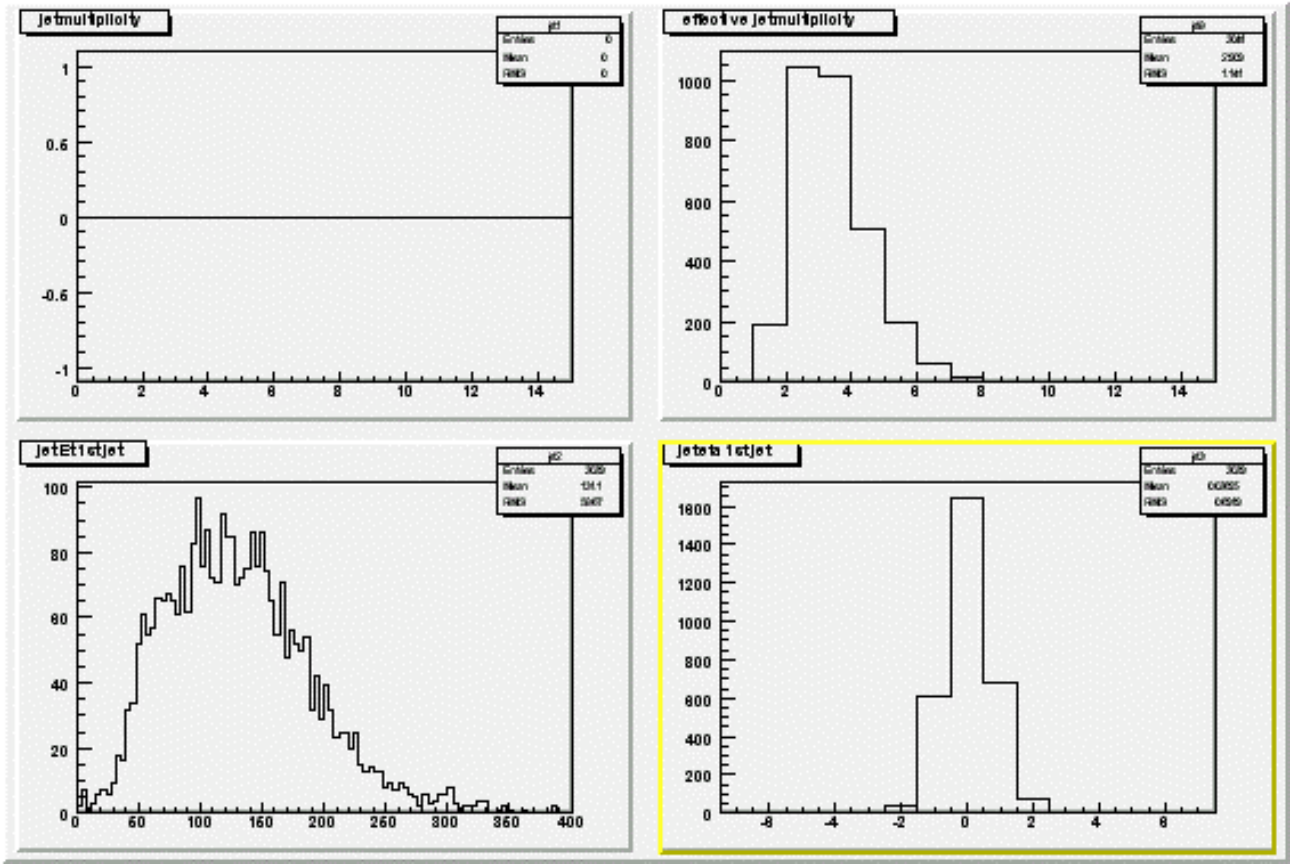
At least 2 Jets - no requirements



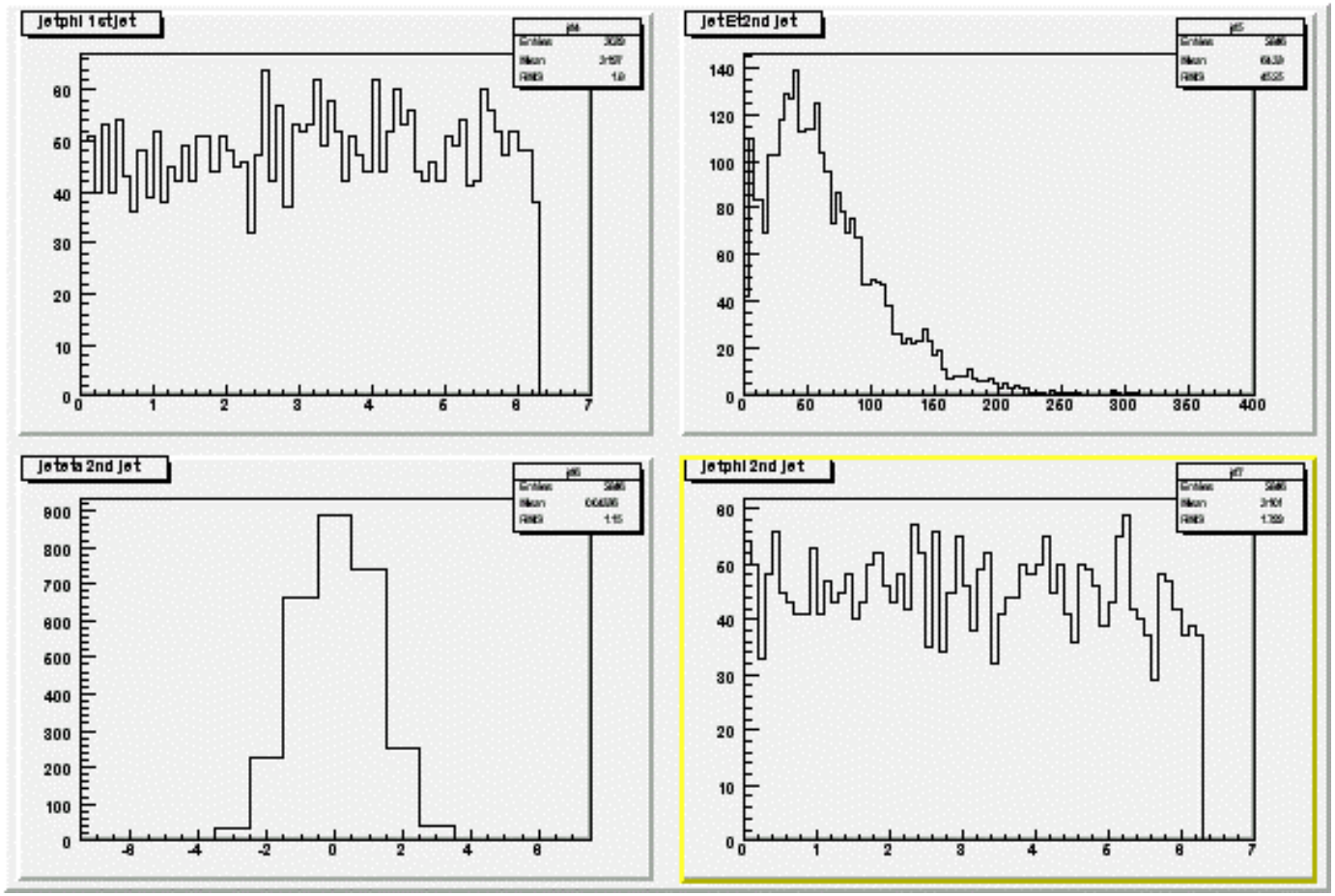
DY + 2 jets


effective jet multiplicity
DY + 2 jets Alpgen + PS
jet Et 1st jet
jet Et 2nd jet
jet eta 1st jet
jet eta 2nd jet

Jets from LQ 220



Jets from LQ 220



Parton level quantities (m_{LQ} =220)